

# Claims

- [c1] A method for identifying one or more color profiles for use with a scan of a printed image, comprising:
- scanning the printed image;
  - determining spatial characteristics of the printed image from the scanned image data;
  - comparing the spatial characteristics of the scanned printed image with spatial characteristics associated with color characterization profiles; and
  - selecting one or more color profiles based on the comparison of the spatial characteristics.
- [c2] The method in claim 1, wherein the spatial characteristics associated with color characterization profiles are determined from scans of color characterization targets used in creating the color characterization profiles.
- [c3] The method in claim 2, wherein the spatial characteristics associated with a color characterization profile are determined during the creation of color profiles.
- [c4] The method in claim 3, wherein the spatial characteristics associated with the color characterization profile are stored with the color profiles.
- [c5] The method in claim 3, wherein the spatial characteristics associated with a color profile are stored within private tags in the color profile.
- [c6] The method of claim 1, wherein the comparing comprises computation of a distance measure between spatial characteristics of the image and

spatial characteristics associated with the color profile.

- [c7] The method of claim 6, wherein the selecting further comprises choosing one or more color profiles which are closest with respect to the distance measure.
- [c8] The method of claim 1, wherein the determining of spatial characteristics further comprises:
  - statistically analyzing the scan of the printed image; and
  - determining spatial variations in the printed image based at least on the results of the statistical analysis of the scan image data.
- [c9] The method of claim 1, wherein selecting one or more color profiles is performed automatically.
- [c10] The method of claim 1, wherein selecting one or more color profiles is performed by blending multiple color profiles using at least weighting factors determined from said comparison of the spatial characteristics.
- [c11] The method of claim 1, wherein selecting one or more color profiles comprises:
  - automatically processing a group of pre-selected color profiles to generate candidate color profiles; and
  - manually selecting one or more color profiles from the candidate color profiles.
- [c12] A method for generating a color profile with associated spatial characterization data, comprising:
  - scanning a printed color characterization target having a plurality of

different colored regions;  
using measurement data corresponding to different colored regions to create a color transformation from scanned values to output color values for the color profile;  
statistically analyzing the spatial distribution of color values in the scanned image of the target; and  
associating spatial characteristics obtained from the statistical analysis with the color profile.

[c13] The method of claim 12, wherein said statistical analysis is conducted independently over the differently colored regions.

[c14] The method in claim 13 wherein the spatial characteristics further comprise records associated with individual spatial statistics for each differently colored region within the target.

[c15] A method of combining image spatial characteristics profiling and color calibration profiling for a printed image, comprising:  
scanning the printed image;  
determining spatial characteristics of the printed image;  
statistically analyzing the spatial characteristics of the printed image;  
determining spatial variations in the printed image based on the analyzed spatial characteristics;  
creating a spatial characteristics profile for the printed image based on the determined spatial variations;  
comparing the printed image spatial characteristics profile with spatial characteristics associated with stored color calibration profiles; and

selecting one or more color profiles based on the comparison of spatial characteristics.

- [c16] The method of claim 15, wherein stored color calibration profiles comprises:
- creating color calibration profiles of scanned predetermined printed images;
  - creating spatial characteristics profiles of scanned predetermined printed images; and
  - storing the color calibration profiles and associated spatial characteristics profiles for the scanned predetermined printed images.
- [c17] The method of claim 15, wherein spatial variations include local spatial variations of the scanned image data.
- [c18] The method of claim 15, wherein spatial variations include dispersion and periodicity.
- [c19] The method of claim 15, wherein spatial characteristics include halftone dot periodicity, halftone screen frequency and halftone screen noise.
- [c20] The method of claim 15, wherein determining an image marking process based on the determined local spatial variations comprises determining one or more data statistics for the scanned printed image.
- [c21] The method of claim 20, wherein determining one or more data statistics comprises determining one or more of an area average or mean of pixels in an image data block of the scanned printed image, an area variance of the pixels for the image data block, extreme minima value,  $\min_a$ , of the

pixels for the image data block, extreme maxima value,  $\max_a$ , of the pixels for the image data block.

- [c22] The method of claim 21 further comprising performing data evaluations using the determined one or more data statistics.
- [c23] The method of claim 22, wherein performing data evaluations comprises one or more of: determining a ratio of the area variance to mean determined for a given block, calculating a distribution of the mean values for large pixel areas, comparing the calculated mean value to the determined  $\min_a$  and/or  $\max_a$  values, and determining a distance between maxima/minima.
- [c24] The method of claim 15, wherein determining an image marking process is used to set color attributes for storage, transmission, transformation or reproduction.
- [c25] A machine-readable medium that provides instructions for determining an image marking process used to create a printed image, instructions, which when executed by a processor, cause the processor to perform operations comprising:
- scanning the printed image;
  - determining spatial characteristics of the printed image;
  - statistically analyzing the spatial characteristics of the printed image;
  - determining local spatial variations in the printed image based on the analyzed spatial characteristics;
  - selecting a color calibration profile tag for the scanned printed image based on the determined local spatial variations in the printed image;

and

determining the image marking process used to create the printed image based on the determined local spatial variations in the printed image and the selected color calibration profile tag.

- [c26] The machine-readable medium according to claim 25, wherein local spatial variations include dispersion and periodicity.
- [c27] The machine-readable medium according to claim 25, wherein spatial characteristics include halftone dot periodicity, halftone screen frequency and halftone screen noise.
- [c28] The machine-readable medium according to claim 25, wherein determining an image marking process based on the determined local spatial variations comprises determining one or more data statistics for the scanned printed image.
- [c29] The machine-readable medium according to claim 28, wherein determining one or more data statistics comprises determining one or more of an area average or mean of pixels in an image data block of the scanned printed image, an area variance of the pixels for the image data block, extreme minima value,  $\min_a$ , of the pixels for the image data block, extreme maxima value,  $\max_a$ , of the pixels for the image data block.
- [c30] The machine-readable medium according to claim 29 further comprising performing data evaluations using the determined one or more data statistics.

- [c31] The machine-readable medium according to claim 30, wherein performing data evaluations comprises one or more of: determining a ratio of the area variance to mean determined for a given block, calculating a distribution of the mean values for large pixel areas, comparing the calculated mean value to the determined  $\min_a$  and/or  $\max_a$  values, and determining a distance between maxima/minima.
- [c32] The machine-readable medium according to claim 25, wherein determining an image marking process is used to set color attributes for storage, transmission, transformation or reproduction.
- [c33] A media/image marking process identification system for a printed page, comprising:  
a memory; and  
a media/image marking process identification determination circuit, routine or application that identifies at least one of a media type for the printed page or an image marking process used to process the printed page, by processing the printed page to determine spatial characteristics of the printed image; statistically analyzing the spatial characteristics of the printed image; determining local spatial variations in the printed image based on the analyzed spatial characteristics; and selecting a color calibration profile tag for the scanned printed image based on the determined local spatial variations in the printed image.
- [c34] The media/image marking process identification system according to claim 33, wherein local spatial variations include dispersion and periodicity.

- [c35] The media/image marking process identification system according to claim 33, wherein spatial characteristics include halftone dot periodicity, halftone screen frequency and halftone screen noise.
- [c36] The media/image marking process identification system according to claim 33, wherein determining an image marking process based on the determined local spatial variations comprises determining one or more data statistics for the scanned printed image.
- [c37] The media/image marking process identification system according to claim 36, wherein determining one or more data statistics comprises determining one or more of an area average or mean of pixels in an image data block of the scanned printed image, an area variance of the pixels for the image data block, extreme minima value,  $\min_a$ , of the pixels for the image data block, extreme maxima value,  $\max_a$ , of the pixels for the image data block.
- [c38] The media/image marking process identification system according to claim 37 further comprising performing data evaluations using the determined one or more data statistics.
- [c39] The media/image marking process identification system according to claim 38, wherein performing data evaluations comprises one or more of: determining a ratio of the area variance to mean determined for a given block, calculating a distribution of the mean values for large pixel areas, comparing the calculated mean value to the determined  $\min_a$  and/or maxima values, and determining a distance between maxima/minima.



[c40] The media/image marking process identification system according to claim 33, wherein determining an image marking process is used to set color attributes for storage, transmission, transformation or reproduction.